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ABSTRACT

The report describes San Jose College's (California) two Web site management and design programs, and provides employment information and job market analysis for the field. The College's Web Site Administration and Web Application Solutions programs offer classes designed to give students the necessary skills in administering a Web site and in creating applications for the Web to compete in a rapidly changing job market. These two technical degrees include classes that cover the programming and networking skills necessary to implement interactive, dynamic technologies supported on many corporate Web sites. Upon successful completion of the Web Site Administration program, students will be able to configure and customize different Web servers on various platforms and troubleshoot Web applications and Web server software. Upon successful completion of the Web Application Solutions program, students will be able to use JavaScript with tools such as plug-ins and Java, and identify security holes and common bugs. Community resources have provided input into the development of the curriculum. According to the California Employment Development Department labor market industry trends and outlook for Santa Clara County for 1995-2002, data processing occupations, including computer programming services and the development and production of prepackaged computer software, will continue to record some of the fastest job growth in the country. (JA)

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Maintaining Large and Small Corporate Websites: San Jose City College's Website Administration Program.

Lucy Dodge

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Maintaining Large and Small Corporate Websites:
San Jose City College's Website Administration Program

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Program Goals and Objectives

San Jose City College's two programs, Web Site Administration and Web Application Solutions, offer classes designed to give students the necessary skills in administering a Web site and in creating applications for the Web to compete in a rapidly changing job market. In keeping with the range of new technologies associated with the growth of the Internet, San Jose City College (SJCC) provides courses that cover a variety of skills necessary to support enterprise-wide intranets, internets, and extranets. The new Web Site Administration and Web Application Solutions programs SJCC (http://www.sjcc.cc.ca.us Select CIS from the drop-down list box for detailed information about these programs.) is implementing will serve this growing job market for Web and networking professionals who are capable of developing, monitoring, and managing a corporate Web site.
These two technical degrees include classes that cover both the programming and networking skills necessary to implement interactive, dynamic technologies supported on many corporate Web sites. Students will be able to obtain a degree in either:

- Web Site Administration - managing a Web site and configuring a Web server
- Web Application Solutions - writing application solutions for a Web site

Students are able to obtain certificates of competency, specialization, and achievement by taking a combination of subject-related courses designed to give them skills in designing and maintaining corporate websites.

Web Site Administration

Upon successful completion of the Web Site Administration program, students will be able to:

- Configure and customize different Web servers on various platforms
- Troubleshoot Web applications and Web server software
- Establish evaluation standards for different types of Web servers and Web software applications running on different platforms
- Use Web server extensions to incorporate support for applications into a Web server
- Integrate interactive forms and database applications into Web pages
- Identify the required browser plug-ins and customization required for client and server browsers
- Integrate various Web technologies used within corporate environments to distribute information, obtain feedback from customers, and publish Web pages
- Identify the structure and content of metadata used for representing information about a Web document
- Create a secure Web application that accepts and submits e-commerce data to a Web server
- Understand basic networking concepts as applied to the Web, e.g., TCP/IP, domain names, clients and servers, and authentication.
- Use and evaluate various types of Web security systems, proxy servers, and firewalls

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- Load, maintain, edit, publish and download files on different systems
- Create Internet e-mail lists and assign aliases and manage Web log files
- Debug and fix Web application client and server errors
- Set up, customize, and maintain site navigation and search tools
- Write Web searches to access database files on a client computer

Web Application Solutions

Upon successful completion of the Web Application Solutions program, students will be able to:

- Use JavaScript with tools such as plug-ins and Java
- Identify security holes and common bugs
- Use JavaScript to design interactive applications that can access data in a database management system (DBMS)
- Build ActiveX components and write CGI scripts for Web mailing and customer feedback forms
- Write programs using scripting languages such as Perl and JavaScript to supplement server- or client-side CGI programs
- Develop customized components for applications
- Extend pages with third party and custom-built controls
- Develop code safety techniques
- Use proven debugging techniques
- Write customized courses for online distribution
- Compile scripts with OLE automation objects
- Create Web applications using Perl libraries available on the Web
- Write CGI scripts to send information to Web browsers
- Build databases, bulletin boards, and e-mail response applications
- Identify ways to avoid security holes and unsafe practices
- Use forms to transfer information from a Web browser to a CGI program
- Use Perl to analyze log files, manage cookies, and assign passwords

Program Rationale

The Internet continues to increase in popularity driven by the rapid growth of these factors:

- A healthy and competitive Internet access provider market
- Enhanced bandwidth becoming available to businesses and homes
- Development of inexpensive standardized tools for publishing on the Web

At the same time, more sophisticated software and technology, such as future generations of browser software (Java, VRML, etc.) are developing. Because of these trends, we need to provide additional courses that offer students the skills necessary to support sophisticated enterprise-wide intranets, internets, and extranets. The need for web masters who are skilled in client/server programming is increasing dramatically. Because of this demand for programming expertise, we also need to offer our students courses in using Java, Visual BASIC, and Perl-based CGI scripts that support the following interactive procedures available on many corporate web pages:

- Feedback forms such as those found on Technical Support web pages
- Credit card order forms
- FTP and SMTP e-mail systems
- Password-protected technical information pages

- Automated web publishing procedures that enable employees to use a standardized template when submitting web pages

Community Support

Community resources have provided input into the development of the curriculum. Those in industry who are directly involved in establishing web sites have been contacted for information related to the proposed curriculum and the skills we need to teach students who plan to become web site administrators. As a result of our having solicited input from our industry contacts, the curriculum will more than likely serve the needs of our students who will be seeking employment as either interns or full-time employees during or after they have completed their training at SJCC.

For students to achieve the goal of being hired as interns or full-time employees, we must not only provide state-of-the-art skills to our students but also work-experience opportunities. The SJCC Workforce Initiative Network (WIN) Program staff members have expertise in marketing our students so they can compete in Silicon Valley's ever-competitive job market. The WIN program, which maintains a database of potential employers, will continue to ensure that internships and job placements are maintained so that successful results can be tracked for program evaluation and modification.

Furthermore, regional community college job placement organizations are currently meeting to develop ways of increasing job placements and enhancing regional employer partnerships.

As the Web Site Administration program grows, the services of the WIN program will be used to increase relationships with employers and opportunities for student internships and job placements. Documentation of internships and job placements will continue to be maintained to sufficiently measure successful results. In addition, a regional community college job placement consortium is currently meeting to increase job placements in this area and enhance employer partnerships regionally.

This curriculum will not only prepare students for employment in industry but also in the academic area. Currently, community colleges hire individuals to manage Web development in both the instructional and administrative areas. Often, the instructional web master manages faculty and student web sites while the administrative web master works for Computing Services, the administrative division of the campus. Job opportunities in both these areas will continue to increase according to current predictions. (For further information, see the Bureau of Labor Statistics, Occupational Employement Statistics Survey, the California Employment Employment Development Department, and Labor Market Information available from America's Career Infonet web site: http://www.acinet.org/acinet)

Employment Information

According to California Employment Development Department Labor market industry Trends and Outlook for Santa Clara County for 1995 to 2002, data processing occupations, including "computer programming services and the development and production of prepackaged computer software, will continue to record some of the fastest job growth in the country." In addition, business services, which includes not only computer programming services but also advertising, security, personnel supply services, "...will grow by 60,300 jobs during the seven year period." In general, the entire services area will add "97,600 jobs and account for 50 percent of the overall non-agricultural growth in Santa Clara County." [1]

Detailed trends from America's Career InfoNet indicate that database administrators, computer support specialists, and other categories of computer scientists will increase by 141% from 1996 to 2002. This is the fourth highest increase ranked by states throughout the United States.

Companies such as Exodus Communications in Santa Clara, the Los Angeles Times, Microsoft, Manpower, and Hewlett Packard list openings for jobs that require Web site administration skills. (Refer America's Job Bank at http://www.ajb.dni.us/ and to the individual company Web sites for the most recent information on available jobs.) Although these jobs are currently listed as Network Integrator/Software Engineer or Professional Internet Technologist, Data Warehousing Consultant (Microsoft), Backend Web Developer (Manpower), Tech Support/Applications Specialist (Hewlett Packard), the skills required are those taught in our Web Site Administration and Application Solutions programs. For example, the Tech Support/Applications specialist at HP must "develop expertise in Web-based client/server development tools/techniques, security tools, and distributed application tools and techniques." The Backend Web Developer (Manpower) must support Internet-based electronic bill payment systems and know Perl, Java, and SQL. The Data Warehousing Consultant (Microsoft) who participates in the design and implementation of data warehousing must have experience using SQL, C, Java, client/server technologies, and Visual Basic. Microsoft is also seeking Applications Development consultants who know Inter/Intranet application development using IIS, IE, ASP, VBScript, Java, HTML, and DHTML. (Consult the JOBTRAK™ Job Listings for additional information.) In the area of audio and Web music distribution, companies such as Liquid Audio are seeking Web Developers, Web UI Designers, and Web Development engineers proficient in Unix, Perl, Java, C++ and SQL databases. (Refer to the http://www.liquidaudio.com site for additional information.)

Although many of these employers may prefer a candidate who has a BS in Computer Science, candidates with several years experience and demonstrated subject matter knowledge will also be interviewed. An Information Architect/DBM for Exodus Communications needs to know how to design, develop, and manage information architecture and solutions for all business areas and ensure that customers can find information about the business enterprise on the Web. Experience with Web-based architectures for information access and storage is a must for this job. Other jobs with titles such "Professional Internet Technologist," require skills such as knowledge of most Internet-related technologies and familiarity with Windows NT and databases such as SQL server.

Job Market Analysis

California Salaries

Salary depends on job and experience although software engineering jobs in the Web area pay $36,000 to $48,000 as beginning salaries. Web site administrators with experience in multi-platform tools can earn a beginning yearly salary of $55,000 to $60,000. Web page designers and HTML programmers earn $15.00 to $20.00 per hour. According to JOBTRAK and the Monster Board, jobs in Web-related fields are increasing more rapidly than in almost any other area. For full-time employees, the salary depends on skills and experience; for part-time employees the salary averages $15.00 per hour. In addition, interns working in various companies can earn a minimum of $8.00 per hour.

Summer and part-time jobs are also available in the field of Web Site Administration. A part-time Web Site Developer at Merlin Media, Inc. in San Jose can earn $12.00 per hour for no experience to $17 per hour for 2 or more years experience. This particular individual

is expected to not only to create Web pages but also to maintain client Web sites for international customers.

The Interactive Salary Guide sponsored by Pencom Inc. offers comparative salaries based on years of experience and programming skills. According to their data available on their Web site, Web-based Applications Developers earn $35,000 with 0 to 1 years of experience and up to $51,000 with 1 to 2 years of experience. Skills required for this job include a knowledge of Java, Javascript, Perl, Intranet/Extranet applications, Apache Web Server, CGI, ActiveX, NetScape server, and Web-based languages such as HTML and XML. Computer software developers with a knowledge of Web servers, Web-based programming languages such as Perl and Javascript can earn from $41,000 with 0 to 1 year of experience to $46,000 with 1 to 2 years of experience. Computer programmers who become systems or network administrators can increase their first year salaries by $2,000 from $51,000 to $53,000 by knowing Web server technologies. (Refer to the Interactive Salary Guide at http://www.pencomsi.com/industry.html , the SuperSite at http://www.supersite.net/TechJobs , the Intra/Internet Web Master at http://techjobs.supersites.net/techjobsn2/inttest , and individual company Web sites for the most recent salary and job information.)

California Employment

In the area of Web Site management, in addition to current requirements for skilled Web Site managers, employers predict that employees capable of performing the following tasks will soon be in demand:

- Load balancing among servers
- Synchronizing multiple servers in diverse locations
- Optimizing database-driven Web sites capable of cross-browser support

If the current employment trend continues, the demand for full-time employees in the area of Web Site management will increase and the need for those whose skills include only Web page design will decrease. Increasingly, companies are hiring full-time employees to manage their Web sites and multimedia specialists who are under contract with companies such as 3DG to design their Web pages. (Refer to the Monster Board at http://technology.monster.com and JOBTRACK™ at http://www.jobtrak.com/employers.html for the most recent employment and salary information. In addition, the Silicon Valley WebGuild Job Board at http://www.ipronetwork.com/JobBank lists specific jobs in Internet and database development areas as well as a variety of local and international jobs.)

Commercial Web Certificates

The San Jose City College Web Administration program is designed to help students prepare for the following commercial exams that are recognized by Silicon Valley companies. By obtaining certification from professional organizations, students are often able to obtain jobs more quickly. The curriculum includes materials and objectives students are expected to know to be able to obtain certificates and pass certification exams offered by the International Webmasters Association (IWA) and Microsoft.

IWA Certified Web Professional (CWP) Certificates

- Site Designer: Implements and maintains Websites using authoring and scripting languages, content creation and management tools, and digital media

- Internetworking Specialist: Defines network architecture, identifies infrastructure components, monitors and analyzes network performance, designs and manages TCP/IP networks
- Enterprise Developer: Builds n-tier database and legacy connectivity solutions for Web applications, using Java, Java application programming interfaces (APIs), Java Database Connectivity (JDBC) solutions, middleware tools, and distributed object models.
- E-Commerce Specialist: Demonstrates expertise in standards, technologies and practices in electronic commerce. Understand and manage the relationships among credit cardholders, issuers, merchants, acquirers, payment gateways and third parties. Understands the uses of Secure Electronic Transactions (SET), cryptography standards, Certificate Authorities, and electronic services.
- Security Specialist: Implements security policy, identifies security threats and develops countermeasures using firewalls and attack-recognition technologies. This individual is expert in transaction and payment security solutions.
- Server Administrator: Manages and tunes E-Commerce infrastructure including Web servers, FTP, news, and mail servers for midsize to large businesses. Server administrators configure, manage and deploy e-business solutions servers.
- Application Developer: Builds client- and server-side Web applications using Rapid Application Development tools and component technologies to implement two-tier database connectivity solutions.

Refer to the IWA Web Site or contact the organization directly at 119 E. Union Street, Suite #E, Pasadena, CA 91103 for additional information.

Microsoft Certificates

Although the Microsoft certificates and courses are subject to change, one of the more recent courses (as of October, 1999) of interest to Web technicians is course 1125 which prepares engineers for passing Exam 70-056, Implementing and Supporting Web Sites. Using Microsoft Site Server 3.0. The course (and, by extension, the exam) covers search capabilities, content management, security strategies for users and servers, capacity planning, backup-and-restore strategies, installation and configuration, component access, publishing documents to a Web site, and analyzing Web site content and usage. Another new Microsoft Certified Professional exam is the Designing and Implementing Commerce Solutions with Microsoft Site Server 3.0.

In addition, an exam currently under development, which our students might be prepared to pass as a result of enrolling in our Web Site Administration program, is the Implementing and Supporting Microsoft Internet Explorer 50 by using the Microsoft Internet Explorer Administration Kit. (Refer to the Microsoft Web Site for further details concerning certificates.)

Knowledge, Skills, and Abilities

During our Industry Advisory Board meetings, employers have indicated their support for our program. Course descriptions and prerequisites have been distributed and discussed. Employers continually indicate interest in hiring SJCC students enrolled in these programs as either interns or full-time employees. However, technical skills alone do not guarantee success on a job. Companies are recognizing the importance of general skills that fall under the category of knowledge, skills, and abilities (KSAs). America's Career InfoNet (http://www.acinet.org/acinet.htm) lists several KSAs desired for computer scientists. These skills include, but are not limited to, the following:

Active learning

- Ability to work with new material
- Critical thinking
- Operations analysis and testing
- Equipment selection

Abilities include

- Written comprehension
- Speech clarity
- Oral expression
- Written expression

These are the tools we also include in our curriculum and the qualities that students gain by taking a well-organized logical curriculum leading to an Associate of Science degree with a specialization in Web Site Administration or Web Application Solutions. As a result, when SJCC graduates are hired by local Silicon Valley companies, they are able to design and maintain corporate web sites efficiently and effectively.

References

[1] California Employment Development Department Labor Market Information, Industry Trends and Outlook, 1995-2002, Santa Clara County.